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Myopic Behaviour and State Involvement in a Pension System: A Cross-section Study for OECD Countries[1]

Introduction

Many countries have been reforming their pension systems as a result of deteriorating demographics and ageing populations. The directions of these reforms vary between countries and some of them lead to more social and others to more liberal pension systems. However, despite the increasing role of voluntary participation in some pension systems, the public part of the system, i.e. that based on mandatory participation, is maintained.

As argued by Barr and Diamond (2006), policy designing pension system must account at least for three sets of market imperfections. The first one are myopic and/or imperfectly informed people. The other two are the missing markets and progressive taxation. In our paper, we focus on myopia as the main reasoning behind the obligation imposed by the state to participate in a pension system. This behavioral bias is indicated in the literature as the main justification for social security programs (for a review see Findley and Caliendo, 2008). The problem of myopia exists when an agent does not save or under-saves for retirement, which can result in the individual being in a poor economic situation in old age. To avoid the negative effects of myopia on the aggregate level, the state plays a role in a pension system, however this role varies between countries.

The problem how much the state should be involved in decisions dealing with saving for retirement and to what extent they should be a matter of individual

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choices is the subject of wide academic discussion. Many economists representing even completely divergent views on the role of the state in an economy, like e.g. Hayek and Stiglitz, are of the opinion that a public pension system should ensure only minimal benefits, as highly adequate, generous benefits ensured by the state can generate many inefficiencies (see Hayek, 1960; Stiglitz, 2000). On the one hand, there are adverse social effects of myopic behavior, such as poverty in older cohorts, and on the other hand, many undesirable consequences of mandating participation in a pension system can emerge. As argued by Whitehouse (2013), there are several arguments against compulsion in a pension system: (1) it provides a target replacement rate which may lead to over-saving and limit individual welfare decisions, (2) it crowds out other forms of savings, which are more rational from the agent's perspective, (3) it may discourage people from working, as pension contributions are often perceived as a component of a tax wedge, (4) it crowds out voluntary savings in the third pillar which otherwise could be greater than mandatory savings, and as result it may lower the replacement rate. The scope of state involvement in the process of saving for retirement that determines the division into liberal and social pension systems also depends on pension system objectives, i.e. poverty alleviation and consumption smoothing and their priority.

The goal of this paper is to study whether the relationships between agents' participation in voluntary pension schemes and some pension system features regarding its public and mandatory character as well as its current and predicted generosity suggest that the myopia is observed. Our paper contributes to the literature in two ways. First, it adds to a relatively small number of studies that verify the myopia hypothesis from a pension policy perspective, i.e. as a rationale for imposing a mandatory pension system. However, given that contemporary pension systems have a mandatory part, the question that the policy makers face is not whether to mandate or not, but what the optimal scope of compulsion in retirement savings is. Second, in our study we apply a new empirical approach. The majority of prior studies on myopia are based on theoretical models, analyses of survey micro data for a single country or psychological experiments. Our study is conducted at a macro level, as it involves aggregated cross-sectional data for over 20 OECD countries. We use OECD and Eurostat data from the period 2011–2013 and employ regression modeling as well as agglomerative hierarchical clustering and k-means clustering to test the above-mentioned relationship. The results of the research could indicate some further directions for pension policy aimed at increasing or maintaining a predominant role of the state in a pension system.

This paper is structured as follows. In the first section, we describe the phenomenon of myopia in pension decisions and present a literature review on the previous empirical studies on myopia. The second section features the theoretical grounds for our empirical approach. In the next two sections, we introduce the research methodology and results of the empirical analysis. The paper ends with synthetic conclusions.

1. Literature review

Myopia is one of the behavioral biases affecting retirement decisions. It applies to the lack of savings or insufficient saving while young, which results in a poor economic situation in old age. It is sometimes identified with "present bias", which is the tendency to give preference to immediate consumption over future consumption (Kane, 2014; Holmes, 2011). Shaviro (2014) introduces the term "multiple myopias" for the various reasons for systematic under-saving for retirement, which are not necessarily of a cognitive nature. These are: (1) naive myopia, (2) sophisticated myopia, (3) procrastination, (4) regret aversion, and (5) multiple selves. Schwarz (2006) distinguishes between myopia and moral hazard as two main factors that are typically indicated as a justification for mandating membership in a pension system. The effects of both are the same, however, agents' motivation is different. Myopic individuals are characterized by shortsightedness; they postpone savings until it is too late. Agents incurring moral hazard intentionally refrain from saving, expecting that society will provide for them in their old age. As stated by Holmes (2011), apart from the problems with individual short-term perspective there are several other reasons for state involvement in the retirement saving process, however the paternalism argument is leading in policy discussions.

According to the classic theories of savings, such as the relative income hypothesis (Duesenberry, 1949), the permanent income hypothesis (Friedman, 1957) and the life-cycle hypothesis (Modigliani and Brumberg, 1954), agents are rational. This implies two assumptions: first, that they are able to solve the optimization problem and second, that they have the necessary willpower to make a rational decision (Benartzi and Thaler, 2007). These assumptions are questioned by behavioral economics. There is a vast body of literature on psychological biases affecting retirement savings decisions including those associated with bounded rationality or irrational expectations (see for example McConnell, 2013; Knoll, 2010; Tapia and Yermo, 2007; Kogut and Dahan, 2012; Mitchell and Utkus, 2003; Byrne et al., 2010; Kane, 2014; Gunaratne and Nov, 2015; Fatas et al., 2007; Laibson et al., 1998; Binswanger, 2012; Bodie and Prast, 2012). Moreover, pension decisions (referring both to accumulation as well as decumulation phase) are complex, and therefore very often difficult to make. This is caused e.g. by the uncertainty of some economic factors which should be taken into account in saving decisions, however are difficult to predict, e.g. lifetime earnings, duration of working life, duration of retirement period, rates of return (Chybalski, 2013). Some other factors refer to macro level, including demographical changes, such as ageing which changes the proportion between generations and, in an obvious way, affects a pension system.

However, the direct relationship between the pension system design and myopic behavior has not been explored extensively in the previous literature. For example, Caliendo and Gahramanov (2011) develop a life-cycle general equilib-

rium model that considers two groups of consumers: myopic ones and optimal savers. In this framework they examine the influence of the reduction of the social security tax rate in the United States on the welfare of the two groups. An inverse relationship between pension system design and myopic agents is studied by Cremer et al. (2007). Using a theoretical model, they explore the consequences of myopic agents for the generosity and redistributiveness of the pension system. Kaplow (2006) focuses on the implications of myopic savings behavior for the labor supply employing a two-period model.

Van de Ven (2010), using a structural model of savings and labor supply, analyzes how myopia influences the behavioral and welfare effects of defined contribution (DC) pension schemes in the UK. Myopia as a behavioral aspect of retirement decisions is also examined on a micro-level using survey data or other micro-datasets. For example, Webb et al. (2014) present the results of the analysis of the Scottish Social Attitudes Survey conducted in 2005, with the main focus on pension uncertainty and myopia. Brown and Previtero (2014) study procrastination as an outcome of present-biased preferences on the large sample of individuals from the three different administrative data sources in the US. Survey-based micro data is also used by Honekamp (2014) to study the impact of myopia on the retirement saving decisions of German households. Laboratory experiments are another way of exploring myopic behavior, but one very rarely applied in the empirical studies. For example, Holmes (2011) in his experimental approach tests a model of saving and retirement timing.

2. Theoretical framework

Our theoretical approach differs from the previous studies in two main aspects. First, it goes beyond the existing field of exploration of the myopia phenomenon. As far as the myopia problem is addressed in the literature, it is usually related to the PAYG social security perceived as a remedy to reduce the negative effects of underestimating the retirement savings of agents (for a review see e.g. Imrohoroglu et al., 2003; Andersen and Blattacharya, 2011; Findley and Caliendo, 2008). However, state involvement in the pension system is not limited only to the social security based on the publicly administered PAYG model. Another role that the state may play when protecting agents from the negative effects of myopia is requiring people to save for retirement through paying contributions not only to mandatory publicly managed pension schemes, but also to mandatory privately managed pension schemes. This results from the fact that myopia consists in the problem that people are not aware of the need to accumulate appropriate long-term assets (or pension rights expressed by accounting provisions) for retirement, regardless whether they use the public or private sector to do so. Moreover, pension systems all over the world have been reformed over the past few decades and funded mandatory schemes were introduced in some countries (e.g. CEE

countries, Latin America). As a result, if a government recognizes myopia and counteracts its negative effects, it decides to build a mandatory pension system, publicly and/or privately managed. The objectives of a pension system in relation to society as a whole can be realized only through widespread (near-universal) participation. If myopic behavior is frequent among agents, this universal participation is ensured by a compulsoriness rule. In the case of the absence of myopia, a widespread coverage should be ensured regardless of whether the system is fully voluntary or fully mandatory. Since the latter case is rather only theoretical, all the empirical pension systems have a mandatory part, however of different sizes. In the liberal pension regimes (e.g. United Kingdom, United States, Ireland) the public mandatory component is relatively small, whereas in the more social regimes (e.g. Austria, France, Germany) it dominates over the private and voluntary schemes (Marcinkiewicz and Chybalski, 2017).

Second, we define myopia as agents' shortsightedness mainly in terms of smoothing consumption over the life cycle through appropriate savings for retirement. As stated previously, myopic behavior manifests itself either in the lack of retirement savings or in insufficient retirement savings. The existence of a mandatory pension system prevents the first. As the great majority of countries have effectively functioning mandatory pension systems, which ensure pension benefits to alleviate poverty among agents, in the empirical studies myopic behavior can be observed at the macro level only in terms of insufficient savings, i.e. the lack of consumption smoothing.

Our research question is whether more liberal pension systems encourage myopic behavior. Liberal pension systems, where the level of compulsion is low, are focused on poverty alleviation as the primary goal, while consumption smoothing is left to individual responsibility. Agents choose on their own whether to save additionally for their old age and how much to save in order to smooth consumption. To test whether the myopia hypothesis really holds, we employ the following theoretical approach, obviously limited by the availability of statistical data. We search for the relationship between the agents' involvement in voluntary pension schemes and some variables characterizing the state involvement in a pension system or the generosity of a pension system. If the popularity of voluntary pension schemes is negatively correlated to state involvement in pension systems or to the generosity of these systems, then the myopia hypothesis does not hold as a justification for a large public pension system. This suggests that agents perceive a pension system in a long-term perspective and by the low state involvement or low current or predicted pension benefits they are aware of the need to accumulate private savings. Nonetheless, if the relation between the popularity of voluntary schemes and state involvement or the generosity of a pension system does not exist or it is positive, it is difficult to accept the myopia hypothesis unambiguously. On the one hand, the myopia hypothesis could be supported when the lack of this relationship results from the fact that agents prefer current consumption over saving for retirement despite the small state involvement in a pension system or its insufficient generosity. On the other hand, agents may expect adequate ben-

efits from the mandatory pension system in the future, but simultaneously they may perceive high political, demographic or other risks in this system, and save independently from the mandatory system.

Our approach has important limitation since it refers only to pension savings accumulated in pension plans, whereas agents can also save by means of other financial products in order to smooth consumption in the long run, however keeping their assets more liquid than in the case of pension plans. Such behavior is consistent with the life cycle hypothesis by Modigliani and Brumberg (1954), since one of the motives to save is of precautionary nature – people accumulate savings to meet possible emergencies, which are unpredictable or difficult to foresee. Therefore, some agents may prefer more liquid short-term assets and reinvest them instead of investing in long-term ones (such as pension schemes for instance). Therefore, we are aware that the myopia we consider in our study refers only to voluntary private saving accumulated in a pension system and disregards long-term pension savings accumulated outside a formal pension system.

3. Data and methods

To test the relationship between the agent involvement in voluntary pension schemes and state involvement and the generosity of pension systems, and additionally to control for agent incomes, we employ the following set of variables:

Y – coverage rate of voluntary private pension schemes by type of plan in 2011, expressed as a percentage of the working age population (15–64 years), calculated as the maximum of two values: coverage rate of voluntary occupational schemes and coverage rate of voluntary personal schemes, or the total value of voluntary schemes (if available) (OECD data from 2011);

$X1$ – the rate of public pension contribution (if nonexistent, $X1 = 0$) (OECD data from 2012);

$X2$ – coverage of mandatory/quasi-mandatory private pension schemes by type of plan, expressed as a percentage of the working age population (15–64 years) (OECD data from 2011);

$X3$ – the ratio between the mandatory public and mandatory private expenditure on old-age pension provisions and total expenditure on old-age pensions (public and private mandatory and private voluntary) (OECD data from 2011);

$X4$ – the net pension replacement rate from the public and private mandatory pension system. We employ the net replacement rate calculated for the person earning an average wage (OECD data from 2012);

$X5$ – aggregated replacement ratio for current beneficiaries (Eurostat data from 2013);

C – GDP *per capita*, in USD, current prices, current PPPs (OECD data from 2012).

The Y variable characterizes the agents' involvement in voluntary pension schemes as a percentage of the working age population. This indicator is more resistant to the differences in the maturity of voluntary pension schemes (expressed e.g. in years) across the countries studied than e.g. the assets accumulated in voluntary pension schemes (as % of GDP). This is an important aspect of testing the mentioned relationship since there are significant differences in the time when voluntary schemes were introduced in various OECD countries. We also consider the coverage rate of voluntary pension schemes as better indicator reflecting the scope of the non-myopic saving behavior than the voluntary saving rate. The latter can be influenced by the unequal saving patterns of different income groups. As a result, coverage rate measures only the proportion of people involved in voluntary pension schemes disregarding the extent of this involvement (measured by e.g. the amount saved). Therefore, the coverage, as opposed to saving rate, is relatively resistant to the saving distribution in the population. The same refers to the resistance to the present labor market condition. For instance, agents can withdraw a part of their saving from voluntary pension schemes (if it is legally permitted) to increase their consumption in the period they are unemployed and do not have sufficient incomes. However, the reduction in their savings does not affect the fact whether they participate in a voluntary pension scheme. Therefore, although labor market condition may affect saving rate, coverage rate should remain more resistant to this.

The $X1$ variable expresses the size of the mandatory pension system imposed on agents by the state. Additionally, it describes the method of financing benefits in a pension system – separate contributions ($X1 > 0$) or taxes ($X1 = 0$). The method of financing may affect pension decisions regarding voluntary savings, since separate contributions can be perceived more as savings and the obligation (liability) of the public or private sector to pay benefits resulting from these contributions in the future (especially in the case of defined contribution or earning related schemes). Pension contribution included in the income tax is perceived more as a tax than as savings and the obligation of the state to pay benefits in the future may be treated only as a political promise. In the case of contributive pension systems, the liabilities seem to be better defined than in the case of tax-financed schemes. $X2$ measures the size of a mandatory (or quasi-mandatory) pension system managed by the private sector. $X3$ expresses the share of expenditure on pension benefits from the mandatory system in the whole pension system (mandatory as well as voluntary). The $X4$ variable is of a predictive nature, since it is based on the simulation of the replacement rate from the mandatory pension schemes (together public and private) for a person entering the labor market in 2012 and earning an average wage. The $X5$ variable is the only one obtained from the Eurostat database and reflects the present (not predicted as in the case of $X4$) aggregated replacement rate (excluding other social benefits). C is the control variable to account for differences in *per capita* GDP levels across studied countries. Apart from the factors resulting directly from pension system parameters, the participation in voluntary pension schemes may be strongly influenced by economic conditions. As indicated in various studies, income level is one of the major determinants of personal saving rates (see for example Loayza et al., 2000 for a review).

Variables $X1$–$X3$ refer to the current conditions of a pension system and directly relate to the significance of its mandatory part, imposed and regulated – but not necessarily administered – by the state. The $X5$ variable refers to the current pensioners and reflects their incomes, but additionally, under the naive expectations assumption, it may serve as an indicator of future benefits. It may be perceived by some current contributors as their future pension provision paid after retirement (their benefits will be similar to those paid today). Some current contributors may be more rational and make decisions with the use of all available information analyzed objectively. Such agents would take the forecasted replacement rates expressed by the $X4$ variable into account. A high pension contribution ($X1$), participation not only in mandatory public, but also in mandatory private pension schemes ($X2$), high spending on pension benefits from the mandatory system ($X3$) or high replacement rates ($X4$ and $X5$) may be perceived by some agents as ensuring adequate benefits and, therefore, additional individual precautions or providence may seem unnecessary to them.

Our method is based on three stages. In the first step, we analyze scatter plots for Y and selected X variables to find possible relationships and outlying objects. Then, in the second step, we estimate a regression model (with the use of the OLS estimator) for the Y variable with X variables as predictors and C variable to control for agents' incomes. In the third step, we employ hierarchical agglomerative clustering and k-means clustering for standardized data and group the studied pension systems in terms of their public and mandatory character as well as their generosity. This aims at comparing identified groups in terms of coverage rates of voluntary pension schemes (Y variable). Similarly to Powell and Barrientos (2004), hierarchical clustering is applied to find the number of clusters of similar pension systems, whereas k-means clustering serves for group identification and further comparisons. The difference between objects and clusters is measured with the use of squared Euclidean distance. Ward's method (based on the analysis of variance) is employed to gather the objects (countries) into clusters (Ward, 1963). The single linkage method and complete linkage method are used to check whether there are significant differences in the dendrograms. The dendograms formed as a result of clustering deliver information on the potential number of pension systems groups identified according to applied differentiation criteria. We use this number to employ k-means clustering in order to examine whether the identified sets of countries are similar and in this way verify the results.

Our study covers the following 26 OECD countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Turkey, United Kingdom, and the United States. However, because of some gaps in the aggregated replacement ratio for non-European OECD countries, we estimate the regression model and conduct hierarchical agglomerative clustering and k-means clustering for 21 European OECD countries.

4. Results

Figures 1–4 present scatter plots for the most significant relationships between Y and selected X variables. We can see that such variables as the rate of public pension contribution, the ratio between the mandatory public and mandatory private expenditure on old-age pension provisions and total expenditure on old-age pensions, the net pension replacement rate from the public and private mandatory pension system, and aggregated replacement rate for current beneficiaries are correlated with the coverage of voluntary private pension schemes. In all cases, the relationship is negative, which suggests that the greater the involvement of the state in a pension system expressed by the mandatory participation in publicly or privately managed schemes ($X1$ and $X3$), or the greater the predicted or current generosity of a pension system ($X4$ and $X5$), the lower the agents' participation rate in voluntary schemes (Y). However, the strongest relationship is observed between the replacement rates (both – predicted for today's contributors, as well as current for today's beneficiaries) and the coverage rates of voluntary schemes. This means that the perceived income from a pension system, expressed by current or predicted replacement rates, seems to be a significant factor determining the decision about participation in voluntary pension schemes to save for retirement. This works as follows: high current or predicted replacement rates from the mandatory system lower the participation in voluntary pension schemes, and *vice versa*, low replacement rates motivate agents to participate in voluntary pension schemes.

Three countries may be identified as outstanding ones. These are Germany, the Czech Republic and New Zealand (omitted in Figure 4 because of data gaps). In these countries, the coverage rates are relatively high. However, in the case of New Zealand, a high coverage rate coexists with a pension system based on tax financing (no separate pension contribution), whereas in the case of the Czech Republic, high coverage is accompanied by high public pension contributions (28%, one of the highest in the studied group of countries). However, the size of the tax incentive for saving in private pension schemes equals nearly 40 percent of contributions in the Czech Republic, whereas the mean value for OECD countries is around 20% (see Whitehouse, 2013). Additionally, agents who decide to join a voluntary scheme in the Czech Republic pay contributions of 5% of gross earnings and, at the same time, their contribution rate to the earnings-related public pension scheme is lowered by 3 percentage points, from 28% to 25% (OECD 2015). So, the participation in a private voluntary pension plan is partially paid from the mandatory contribution to the public PAYG scheme. However, there is no option to reverse participation in a private scheme. Thus, it is voluntary but an agent can make only one decision – to join or not to join this scheme. In Germany, tax relief for private pension schemes is also significant and equals almost 40% (see Whitehouse, 2013).

The analysis of the plots and identified linear relationships allow estimation of a regression model for the coverage rate (Y) with predictors reflecting the public and mandatory character of the studied pension systems ($X1$–$X3$) and their generosity ($X4$ and $X5$) as well as agents' income measured by GDP *per capita* (C).
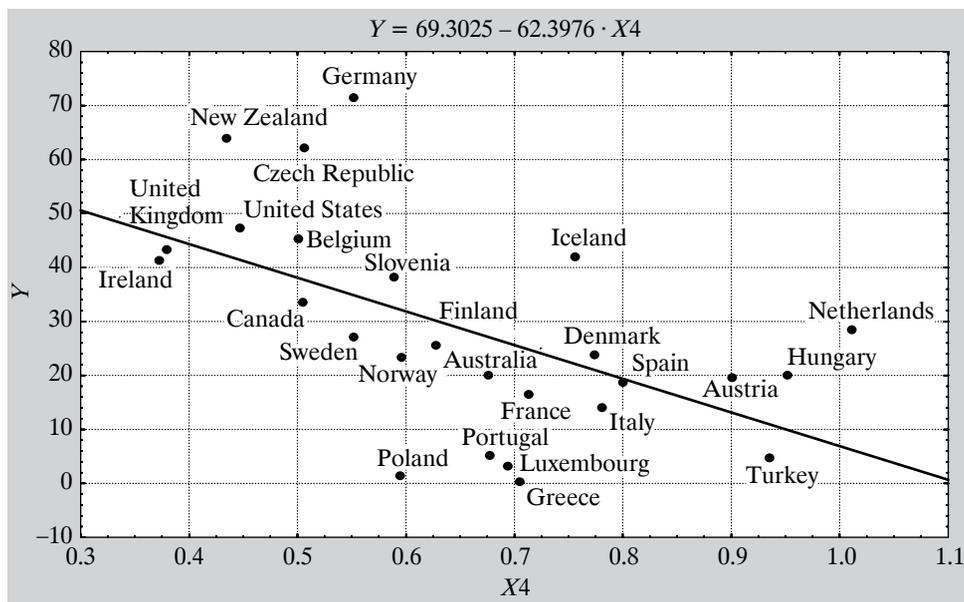
F i g u r e 1

Scatter plot for Y and $X1$ variables
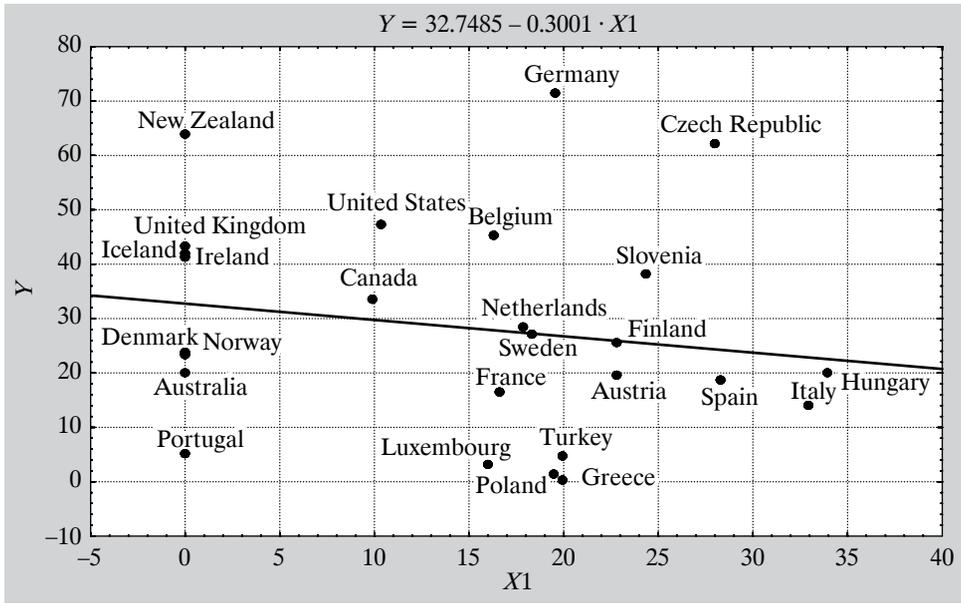
Source: own elaboration.

F i g u r e 2

Scatter plot for Y and $X3$ variables
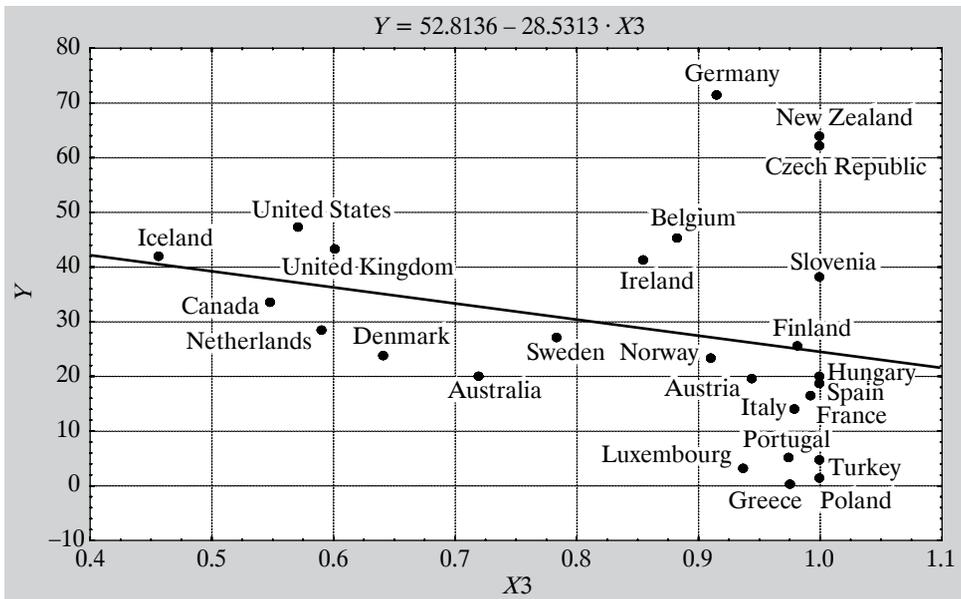
Source: own elaboration.

F i g u r e 3

Scatter plot for *Y* and *X*4 variable

Source: own elaboration.

F i g u r e 4

Scatter plot for *Y* and *X*5 variable
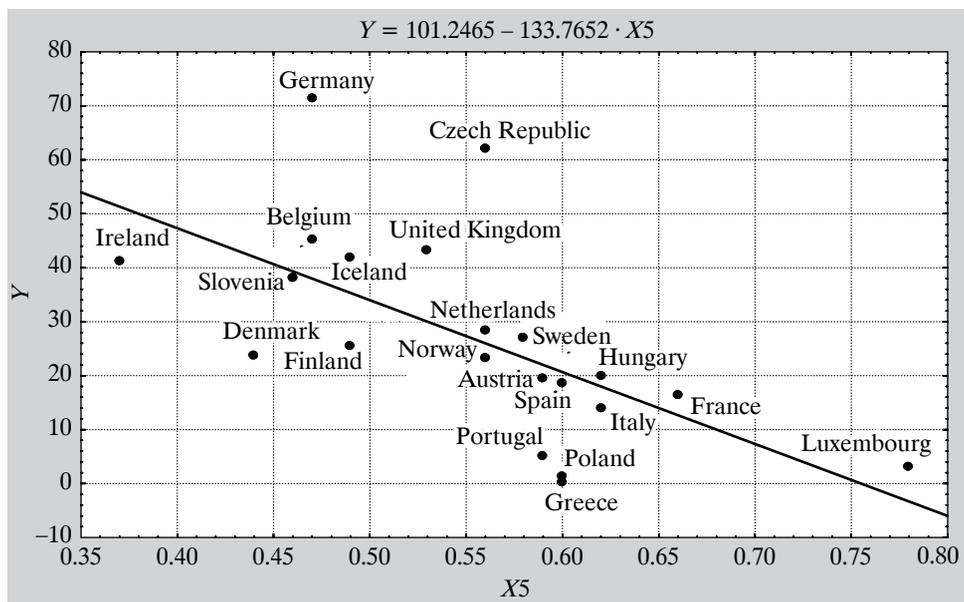
Source: own elaboration.

The model is estimated for 21 European OECD countries. The results are presented in Table 1.[2] For a p-value < 0.07 $X1$ – the ratio between the mandatory public and mandatory private expenditure on old-age pension provisions and total expenditure on old-age pensions, $X3$ – the ratio between the mandatory public and mandatory private expenditure on old-age pension provisions and total expenditure on old-age pensions, $X4$ – the net pension replacement rate from the public and private mandatory pension system for current contributors, and $X5$ – the aggregate replacement ratio for current beneficiaries, are significantly correlated to the coverage rate of voluntary pension schemes. However, in the case of $X1$, the sign of the estimated parameter (1.053) is not consistent with the sign of the Pearson's correlation coefficient for Y and $X1$ (–0.068)[3]. Therefore, we should not interpret the $X1$ variable as significantly affecting Y. As a result, we can initially identify three important factors having a negative (parameters lower than 0) impact on the coverage rate of voluntary pension schemes. These are variables $X3$, $X4$ and $X5$. The first one represents the role of mandatory/quasi mandatory schemes in a pension system, whereas the next two variables refer to the generosity of a pension system, both current and predicted. Thus, the greater the membership in mandatory schemes ($X3$), the lesser the coverage of voluntary schemes. This suggests that agents who save for retirement in private mandatory schemes may treat them as complementary to public ones and do not need to accumulate assets in voluntary schemes. As far as the generosity of pension schemes is concerned, it affects coverage rates of voluntary schemes negatively, which is consistent with the primary conclusions drawn from scatter plots. This negative relationship may be interpreted as follows: the greater the perception of adequate pensions (today or in the future), the smaller the need to save for retirement voluntarily.

In the next step we divide all the 21 studied pension systems in terms of two criteria. The first refers to the mandatory and public character of a pension system ($X1$–$X3$ are differentiating variables). The other reflects the generosity of a pension system ($X4$ and $X5$). Two applied methods – hierarchical agglomerative clustering and k-means clustering give very similar results for the first grouping ($X1$–$X3$) and absolutely convergent results in the case of the second grouping ($X4$ and $X5$). Since in the case of the first criterion the differences between two identified groups of pension systems in terms of coverage rate of voluntary schemes are insignificant, we disregard it in the following part of the paper and focus on the significant differences between groups identified with the use of the generosity criterion.

The dendogram in Figure 5 as well as k-means clustering allow placement of pension systems into the two following groups. The first one – more generous – includes: Austria, France, Greece, Hungary, Italy, Luxembourg, Netherlands, Portugal, and Spain. The other – less generous – consists of Belgium, the Czech Republic, Denmark, Finland, Germany, Iceland, Ireland, Norway, Poland, Slo-

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[2] The model was tested in terms of: (1) normal distribution of residuals: Shapiro-Wilk test, $p = 0,215$; Jarque-Bera test, $p = 0,382$; Lilliefors test, $p = 0,43$; (2) heteroscedasticity of residuals: White test, $p = 0,916$; Breusch-Pagan test, $p = 0,546$.

[3] Removing $X1$ from the model does not change the signs of other explanatory variables.

T a b l e 1

**Regression model (OLS estimator) for coverage rate
of voluntary pension schemes in European OECD countries**

	Parameter	Standard error of estimation	t statistics	p-value
Intercept	164.128	28.220	5.816	0.000
$X1$	1.053	0.369	2.852	0.013
$X2$	–0.138	0.092	–1.508	0.154
$X3$	**–68.269**	**26.830**	**–2.545**	**0.023**
$X4$	**–44.186**	**21.893**	**–2.018**	**0.063**
$X5$	**–129.828**	**43.006**	**–3.019**	**0.009**
C	0.275	0.221	1.246	0.233
R^2	0.684			
F-statistics	5.057			
p-value	< 0.006			

Source: own computations.

F i g u r e 5

**Dendogram for 21 European OECD countries in terms of the
(present and predicted) generosity of pension systems ($X4$ and $X5$)**
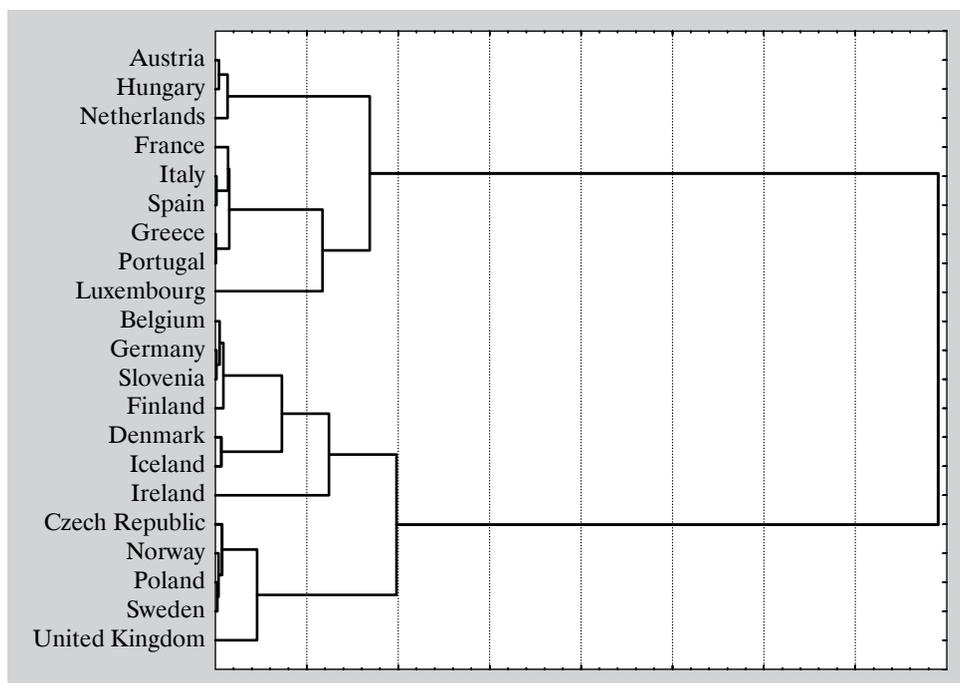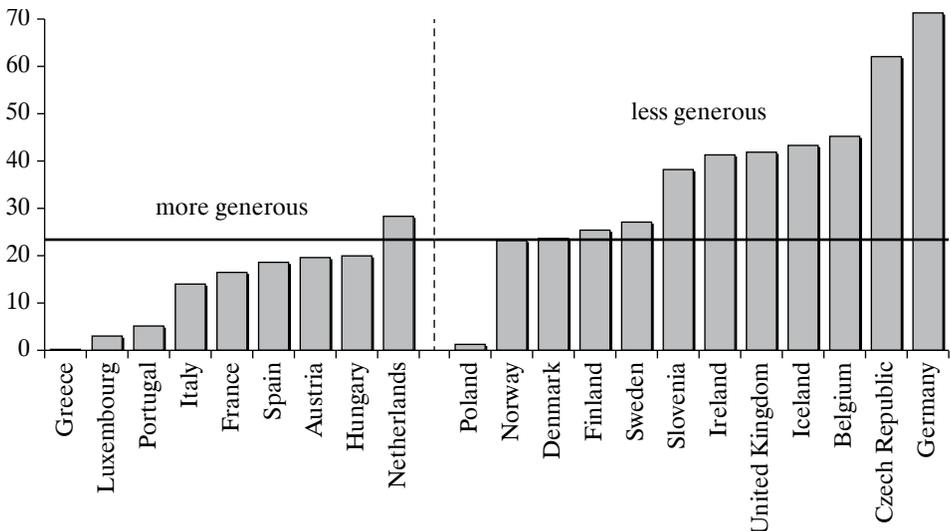

Source: own elaboration.

venia, Sweden, and the United Kingdom. Table 2 presents the differences (measured by means and medians) between these groups in terms of $X4$ and $X5$, as well as Y variables. Additionally, the tests for the two means confirm that for $X4$ and $X5$ the group of more generous pension systems is significantly different than the group of less generous pension systems (means of $X4$ and means of $X5$ are statistically significantly different in the groups for a p-value < 0.001). In terms of the coverage of voluntary pension schemes (Y), these groups are also different and for a p-value < 0.001 the mean of Y for the more generous group is statistically significantly lower than that for the less generous group. This is illustrated also by Figure 6. In the group of more generous pension systems, eight countries (out of nine) have smaller coverage rates of voluntary pension schemes than eleven countries (out of twelve) in the group of less generous pension systems.

Table 2

**Means and medians of Y, $X4$ and $X5$ variables
for more and less generous pension systems**

Pension systems	Parameter	Y	$X4$	$X5$
More generous	Mean	13.923	**0.804**	**0.624**
Less generous		**36.987**	0.567	0.502
More generous	Median	16.469	**0.782**	**0.600**
Less generous		**39.750**	0.571	0.490

Source: own computations.

Figure 6

Voluntary pension coverage rates (%) for more and less generous pension systems

Source: own elaboration.

Conclusions

Our study allows an approach to the problem of myopia from a new empirical and macro-level perspective. All contemporary pension system have their mandatory part, but they vary in terms of the scope of compulsion, which is usually connected with the generosity of a mandatory pension system. More liberal pension systems are expected to have lower replacement rates and more social pension systems are characterized by higher replacement rates (see for example Scruggs 2006). In our analysis, we treat compulsion in a pension system, identified with state involvement in the process of saving for retirement, as a gradable category. Moreover, we assume that it has a multi-dimensional nature. Thus, we test whether the low level of compulsion in a pension system is accompanied by individual pension prudence manifested in higher coverage of the voluntary pension plans. If not, it would suggest myopic behavior observed at the aggregated (macro) level, i.e. across society. Then, further studies encompassing not only data on participation or saving rates in pension plans but also information on voluntary long-term savings (or reinvested short-term savings) outside the formal pension systems would be necessary to find stronger arguments in favor of myopia.

Our study yields two different results. First, we have not been able to confirm a significant relationship between agent participation in voluntary pension schemes and the mandatory and public character of pension systems. In respect to this dimension, we only noticed that in the studied group of countries, a greater share of mandatory (public and private) expenditure on old-age pension provisions in total expenditure on old-age pensions is accompanied by lower coverage rates in voluntary pension schemes. Second, we find a strong and statistically significant negative relationship between agent participation in voluntary pension schemes and the current as well as predicted generosity of pension systems. The greater the current and predicted replacement rate, the lower the coverage rate of voluntary pension schemes. Both of these replacement rates (not only the predicted one) can be perceived as future replacement rates for today's contributors. Some of them may be more naive than rational and, as a result, expect that today's replacement rates will also be valid in the future. More rational agents using all the available information may make decisions about voluntary saving for retirement on the basis of predicted or simulated replacement rates. However, one can suppose that naive behavior is more likely and common across societies than rational behavior, since agents are rather better informed about current replacement rates than forecasted ones.

These main results of the study allow the following synthetic conclusion to be drawn: in countries with less generous pension systems, voluntary schemes are more popular and better covered by working population. Therefore, we do not find any empirical evidence in the studied cross-sectional data, which would support the view that the myopia is observed at the aggregated level. This suggests that myopia may not be an argument in favor of a greater state's involve-

ment in a pension system. This refers to both public management as well as the compulsoriness of participation in pension schemes. Myopic agents, regardless of the replacement rates (current or predicted), would rather under-save for retirement, whereas our results referring to OECD countries show something quite different – agents seem to analyze replacement rates and take them into account when making decisions about voluntary pension schemes. Simultaneously, the rate of mandatory pension contribution is not a factor affecting the popularity of complementary saving for retirement. Thus, agents probably do not perceive a pension contribution as a determinant of their future benefit paid from the mandatory pension system. Their participation (or not) in mandatory or quasi-mandatory pension schemes also does not affect similar participation in voluntary schemes.

This conclusion does not question the role of the state in a pension system. Contemporary pension systems are based on the public sector to a lesser or greater extend and this will not change in the predictable future. Nevertheless, some countries decided to make their pension systems less public and more private, or less social and more liberal. Our study proves that regardless of the state involvement in a pension system and its mandatory character, agents seem to have the ability to adapt to these changes. As a result, in countries with less generous pension systems agents are more involved in voluntary pension schemes. This suggests they are not myopic. Therefore, it may not require a significant state's involvement to make a pension system (as a whole, consisting of mandatory and voluntary components) adequate in terms of incomes.

As previously mentioned, in countries where the level of compulsion is smaller, one could expect lower generosity of the whole (public and private) pension system. This implies that both studied dimensions of state involvement, i.e. the mandatory character of a pension system and its generosity, should have a similar impact on the participation in voluntary schemes. Nevertheless, our results show that greater compulsion measured by the higher level of pension contribution rate is not accompanied by smaller involvement in voluntary pension plans, whereas greater current and projected replacement rates are significantly related to the coverage of voluntary pensions. Redistribution embedded in the benefit calculation formula could possibly be the reason for this inconsistency, as it distorts the relationship between contributions (earnings) and benefits. As stated by Cremer and Pestieau (2011), there is a complex relationship between redistribution and forced saving.

Our study has of course its limitations. The most important one is the identification of participation in voluntary pension plans with additional retirement savings. Thus, we disregard other forms of savings that could be also used to smooth consumption in life cycle. This simplified approach results from the fact that on the aggregate level it is very difficult to distinguish between short-term ordinary savings and long-term retirement savings. That is why in our analysis we consider only voluntary participation in saving plans dedicated strictly to retirement purposes. The same limitation refers to our perception of myopic behavior

– we analyze it only with the reference to the formal pension system. We have not tried to find an optimal proportion between compulsoriness and voluntariness in a pension system. However, our conclusion that agents are not myopic and there-fore, an excessive involvement of the state in a pension system is not necessary, does not mean that pension systems should be only voluntary. It is very likely that a given scope of the state's engagement in a pension system is required to teach agents how to behave rationally and not to be myopic. It may work like a cata-lyst – it is needed to activate agents' conscious participation in a pension system. Another limitation of our study refers to the fact that we disregard some context information that also may influence agents' saving behavior in a given country, such as dependency paths in reforming pension systems, the cultural and histori-cal pattern that shapes people's economic behavior, as well as the development of the long-term saving products market. There may be an indirect linkage between these factors and adopted pension model (regime) or more general, welfare state model.

The problem of the existence of myopia in society can be considered in the context of voluntary retirement savings drivers (see eg. Simonovits, 2011). In this study, we focus on the systemic features of the pension systems, i.e. their more social or liberal nature rather than parametric settings such as tax in-centives. Nonetheless, our simultaneous research on myopia and participation in voluntary pension schemes accounts also for other possible factors or con-trol variables of these phenomena, namely interest rates, method of financing (PAYG vs funded), modality of pillars (DC vs DB), or the tax treatment used to encourage agents to save additionally for retirement in voluntary pension plans. However, as stated by Whitehouse (2013), the link between the cover-age rate of voluntary pension schemes and tax incentives is ambiguous and it is difficult to say whether it is positive or not. Nevertheless, we do not exclude this relationship and study this problem separately as a further development of our research.

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KRÓTKOWZROCZNOŚĆ W ZACHOWANIACH JEDNOSTEK A ROLA PAŃSTWA W SYSTEMIE EMERYTALNYM: ANALIZA PORÓWNAWCZA DLA KRAJÓW OECD

Streszczenie

Autorzy starają się odpowiedzieć na pytanie, czy obciążenie behawioralne, jakim jest krótkowzroczność (myopia) w zakresie indywidualnych decyzji emerytalnych faktycznie występuje i uzasadnia istotną rolę państwa w systemie emerytalnym w celu zapewnienia odpowiedniej adekwatności dochodowej. Analizie poddają zależność pomiędzy uczestnictwem obywateli w dobrowolnych planach emerytalnych i wybranymi cechami systemu

emerytalnego, charakteryzującymi jego publiczny i obowiązkowy charakter, jak również jego obecną i oczekiwaną hojność. Przeprowadzone badanie empiryczne obejmuje ponad 20 krajów OECD i oparte jest na danych przekrojowych z okresu 2011–2013. Wykorzystano w nim metody modelowania ekonometrycznego oraz wielowymiarowej analizy statystycznej. Uzyskane wyniki wskazują, że dane zagregowane do poziomu makro nie potwierdzają występowania zjawiska myopii w decyzjach emerytalnych. W krajach z mniej hojnymi systemami emerytalnymi uczestnictwo osób pracujących w dobrowolnych planach emerytalnych jest bardziej powszechne. To sugeruje, że ludzie przyzwyczajają się do obowiązującego w danym kraju systemu emerytalnego i uwzględniają jego hojność i relację między publicznym i prywatnym segmentem w podejmowanych decyzjach o uczestnictwie w dobrowolnych planach emerytalnych. Dlatego myopia nie może być argumentem wspierającym dominującą rolę państwa w systemie emerytalnym. Dotyczy to zarówno publicznego zarządzania systemem emerytalnym, jak i szerokiego zakresu obowiązkowego systemu emerytalnego. Uzyskane wyniki nie kwestionują roli państwa w zabezpieczeniu emerytalnym, stanowią tylko argument za jej racjonalizacją.

Słowa kluczowe: krótkowzroczność, emerytury, oszczędności, wygładzanie konsumpcji, OECD

JEL: H55, E21, E03, O57

MYOPIC BEHAVIOUR AND STATE INVOLVEMENT IN A PENSION SYSTEM: A CROSS-SECTION STUDY FOR OECD COUNTRIES

Summary

The study tries to verify whether the behavioural bias called myopia actually exists in pension decisions taken by individual agents, thus justifying significant state involvement in a pension system to ensure income adequacy. The authors examine the relationship between agent participation in voluntary pension schemes and some pension system features regarding its public and mandatory character as well as its current and predicted generosity. The empirical research involves aggregated cross-sectional data for over 20 OECD countries. Regression modeling as well as agglomerative hierarchical clustering and k-means clustering is employed to test the above-mentioned relationship. The results, suggest that aggregate data do not confirm the existence of myopia on pension decisions. In countries with less generous pension systems, voluntary schemes are more popular and better covered by working population. This suggests that people adapt to the pension system in their country and take its generosity as well as the relation between public and private character into account when deciding about the participation in voluntary pension schemes. Therefore, myopia may not support a greater state's involvement in a pension system. This refers to both public management of the pension system as well as the broad scope of obligatory pension schemes. The results do not question the role of the state in a pension system, they deliver only an argument in favor of the rationalization of this role.

Key words: myopia, pension, saving, consumption smoothing, retirement, OECD

JEL: H55, E21, E03, O57

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НЕДАЛЬНОВИДНОСТЬ ПОВЕДЕНИЯ ГРАЖДАН И РОЛЬ ГОСУДАРСТВА В ПЕНСИОННОЙ СИСТЕМЕ: СРАВНИТЕЛЬНЫЙ АНАЛИЗ ДЛЯ СТРАН ОЭСР

Резюме

Авторы пытаются ответить на вопрос, насколько такая черта характера как недальновидность (миопия) при принятии индивидуального решения по обеспечению себя на старость, имеет значение и дает право государству играть существенную роль в построении пенсионной системы. В статье анализируется зависимость между участием граждан в добровольных планах по накоплению средств на будущую пенсию и специфическими свойствами пенсионной системы, определяющими ее всеобщий и обязательный характер, а также нынешнюю и ожидаемую величину выплат. Проведенное эмпирическое исследование опирается на многомерные данные за период 2011–2013 годы из более чем 20-ти стран ОЭСР. В нем были использованы методы эконометрического моделирования и многомерного статистического анализа. Полученные результаты указывают, что данные, агрегированные до уровня макро, не подтверждают наличия явления миопии в решениях относительно пенсий. Участие работников в добровольных планах по накоплению средств на будущую пенсию является более массовым в странах, где пенсионные выплаты невелики. Это говорит о том, что люди привыкают к действующей в данной стране пенсионной системе, учитывают ее возможности, соотношение между публичным и частным сегментами и на основании этого принимают решения относительно участия в добровольных пенсионных планах. Именно поэтому миопия не может быть аргументом, доказывающим необходимость доминирующей роли государства в пенсионной системе. Это касается как публичного управления пенсионной системой, так и широты диапазона обязательной пенсионной системы. Полученные результаты не оспаривают роли государства в плане пенсионного обеспечения, а являются аргументом в пользу ее рационализации.

Ключевые слова: недальновидность, пенсии, сбережения, выравнивание потребления, ОЭСР

JEL: H55, E21, E03, O57